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Seat, Particularly an Air Passenger Seat

The invention relates to a seat, particularly an air passenger seat, having a seat component and a backrest having a backrest element with a bent, one-piece frame component consisting of at least one hollow section.

DE 100 50 151 C1 discloses a backrest element for a seat fixture with a frame of wood, light metal, or plastic forming the edge outline, a frame having, at least in some areas, a groove introduced into the narrow side of the edge and a pouch-like covering pulled over the frame and having piping which corresponds to the groove when in the use position and which is introduced into the groove inside the pouch on the covering. Provision is made as additional configuration of the disclosed solution such that the groove receiving the piping is configured in the side edges and in the upper edge of the frame rest. As additional configuration provision may be made such that the edges of the side of the frame are designed in the lower area to be offset slightly inward and to have no groove. In the disclosed solution the backrest is configured to be curved

in order to achieve optimum seating comfort and in particular to provide support for the back of a seat occupant. In addition, the frame metal is in the form of a sort of backrest shell with mounting surfaces for the respective fabric component mounted on the front and rear sides; mounting surfaces of plastic or leather or composite materials may be used in place of textiles and the respective center area is clear of the backrest element so that to this extent covering of the backrest continues without additional support. Because of the elastic configuration of the respective cover component, the area of the back of a seat occupant is nevertheless supported safely and comfortably during the seating process.

In the disclosed solution the cover of the backrest is guided along the side edge component element, without undesirable movement of the cover off center, since the inner piping of the cover is guided inside the piping groove. However, the disclosed solution may not be transferred to seats such as motor vehicle or aircraft passenger seats. For one thing the frame structure as configured is too weak to absorb the forces arising in the event of a crash. For another there is no assurance that in the event of application of a heavy load to the backrest structure the piping component and accordingly the cover structure would not be unintentionally pulled out of the receiving groove in the side edges of the frame component, something resulting in separation of the cover from the backrest.

On the basis of this prior art the object of the invention is to create a seat having a backrest component which permits greater safety especially in the event of a crash. The object as thus formulated is attained by a seat having the features specified in claim 1 in its entirety.

In that, as specified in the characterizing part of claim 1, the frame component has at least to some extent an additional hollow section, and in that the juxtaposed hollow sections are mounted one after the other in the customary direction of movement (direction of flight) of the seat, a sort of two-chamber hollow section solution is achieved for the bent, one-piece frame

component in the relevant area, something which rigidifies the backrest element in the relevant areas to the extent that the base frame structure of the backrest element is more less preserved even in the event of a crash and this structure is not unintentionally folded together nor fails in another direction harmful to the seat occupant. In addition, because of the hollow-section configuration, the rigidified solution claimed for the invention is not made heavier than the flat contact surfaces disclosed for the solution described in the foregoing; this is a factor especially if the seat claimed for the invention is used in aircraft, in which weight reduction is known to result in increase in the payload. It has also been found that the covering elements needed for supplementing the backrest may be more securely fastened to the hollow-chamber section solutions in question than to the conventional groove-piping fastenings mounted on the sides of the frame component.

In one preferred embodiment of the seat claimed for the invention the backrest element has the double-chamber hollow section in its lower area when in the service position, preferably in the area of the lower third of this backrest element. The rigidity in question of the backrest element structure is of particular importance precisely in this lower area in absorption of crash forces. Additional weight may also be conserved by not providing the double-chamber hollow section for the entire frame component but exclusively for the area of the backrest of particular relevance to safety engineering, an area in which the backrest is hinge-connected to the point of transition to the conventional seat element so that its tilt may be adjusted.

In another especially preferred embodiment of the seat claimed for the invention the backrest element is bent in the shape of a U, a common chamber wall separating the adjacent hollow sections. This results to a great extent in the torsional rigidity desired for the backrest, so that the forces of the seat occupant are absorbed in each seating position reliably and comfortably for the seat occupant. A contribution to this end is also made by the circumstance

that preferably the cross-section selected for the hollow section preceding in the usual direction of movement is the same as or larger than the cross-section of the following hollow section.

In another preferred embodiment of the seat claimed for the invention the chamber wall of the preceding front hollow section facing in the usual direction of movement (direction of flight) is provided with a slant extending in the longitudinal direction of the backrest, a slant which forms an imaginary V with the opposite slant of the other front hollow section of the U-shaped frame component. In this way a part of the fabric element, which may be fastened to the U-shaped frame component, is supported in two dimensions by way of the slants indicated, so that an effective support is obtained and the fabric elements which may be received in longitudinal recesses of the hollow section provided are deviated by more than 90°, so that undesirable removal from the fastening groove in the section is reliably prevented.

Other advantageous embodiments of the seat claimed for the invention are specified in the dependent claims.

The invention will be described in detail in what follows with reference to the drawing, in which, in diagrammatic form not drawn to scale,

FIG. 1 presents a presents a perspective rear view of the one-piece frame component of the backrest bent to form a U;

FIGS. 2 and 3 present a perspective top view of a cross-section of the two-chamber hollow section of the backrest frame component shown in FIG. 1, in one instance a piping section being used and in the other instance a fastening wire or rod in order to fasten a cover element on the backrest element indicated.

A modern aircraft passenger seat of the latest generation is described, for example, in DE 100 19 484 submitted by this applicant. The disclosed solution relates to an aircraft passenger seat having a seat element and a backrest which are held so as to be movable in relation to each other by way of at least one adjustment unit, the respective adjustment unit having several articulations which are connected to each other at least in part by way of a bar support structure with individual bar components which hold the seat element upright in relation to a floor of a motor vehicle or aircraft. By means of an actuating unit the components of the aircraft passenger seat are made to execute positioning movements by which the seat component may be moved from an initial position to at least one other position and back. In addition to the seat component, the other components of the seat such as foot and leg support and backrest may be positioned at a large number of freedom of movement degrees so that, in addition to various comfort positions, a rest position is reached for the seat occupant, one in which the backrest is made by a restraint, as a result of tilting movement of the bar support structure, to follow the inclination of the seat component so that an inclined rest surface is formed for the seat.

The backrest element 10 described in what follows and illustrated in the figures is to be used by preference for aircraft passenger seats configured for this purpose. The backrest element 10 in question is outfitted with a one-piece frame component 12 bent so as to assume the shape of a U and consisting of at least one hollow section 14. In addition to this first hollow section 14 the frame component has at least in part another hollow section 16. The adjoining hollow sections 14, 16 are mounted so as to be positioned one behind the other in the customary direction of flight of the seat (flight direction 18). The respective flight direction 18 is indicated by an arrow in FIG. 1.

When the seat is in the service position, as illustrated for the back element 10 in FIG. 1, this element 10 has the double-chamber hollow section 14, 16 in the area of its lower third. As is to be seen in FIGS. 2 and 3 in particular, a common chamber wall 20 separates adjoining hollow

sections from each other. As is also to be seen in FIGS. 2 and 3, the cross-section of the hollow section 16 which is in front in the customary direction (direction of flight 18) is the same as or larger than the cross-section of the following hollow section 14. The chamber wall facing in the direction of the customary direction of movement (flight direction 18) of the preceding front hollow section 16 is provided with a bevel 26 extending in the longitudinal direction 24 of the backrest. This bevel 26 forms with the opposite bevel 26a of the other front hollow section 16 of the U-shaped frame component 12 an imaginary V 28, the bevels 26, 26a of the respective imaginary extension meeting in the area of the longitudinal direction 24 of the backrest. The cross-sections in question of the two hollow sections 14, 26 are otherwise configured to be more or less square or rectangular and the corners of the respective section 14, 16 preferably are rounded.

As is also to be seen in FIG. 1, the rear hollow section 14 is in the clear especially in the upper third of the section wall 30 opposite the bevel 26, 26a, so that there remain in this area more or less only the web walls 32 extending in parallel with each other, which web walls are cut back even further in the direction of the chamber wall 20 in the upper closing area of the frame component 12. In order to make room for reception of a table component not shown which may be folded so as to be integrated into the backrest, in the rear area of the latter, a corresponding recess 34 is made in the central third of the frame component 12 in such a way that the web walls 32 are also cut back as far as the chamber wall 20 referred to.

To the extent that the web walls 32 remain in the area of the upper two-thirds of the frame component 12, they also contribute to this extent also to stabilization of the entire backrest element 10. As is shown in the illustrations in FIGS. 2 and 3, the respective bevels 26, 26a are each delimited on the edge side by a longitudinal duct 36, 38 which extends into the interior of the other hollow section 16 and accordingly is integrated into it. The longitudinal duct 36, 38 is ring-shaped in cross-section and in the direction of the 26, 26a communicates with the exterior

by way of a strip opening 40. The longitudinal ducts 36, 38 in question serve either to receive a piping section 42 (see FIG. 2) or to receive a bar or wire section (see FIG. 3).

A cover component 46 such as one in the form of a net, as shown in FIGS. 2 and 3, or in the form of a cover fabric, leather cover, or the like (not shown) may be fastened on the backrest element 10 by means of the sections 42, 44 in question. For this purpose the piping section 42 may be configured as a plastic section strip which may be connected to the cover component 46 by means of an adhesion or extrusion process. In the solution illustrated in FIG. 2 the cover component 46 is wrapped around the bar or wire section 44 and fastened by clamping in the associated opening 40. In that two longitudinal ducts 36, 38 are present in the area of the bevels 26, 26a, the duct 38 on the left as viewed in the line of sight to FIGS. 2 and 3, for example, may serve to receive the net as cover component 46 and the right duct 36 to receive a cover material or a leather cover component, which in turn is fastened as is the net and then overlaps this net toward the exterior.

As a rule, the longitudinal ducts may also be positioned in the area of the rear hollow section 14 in order thus to participate in covering the double-chamber hollow section of the respective cover component (not shown). In any event the bevels 26, 26a in question provide a level surface for application of the cover component 46 extending over the bevels, so that improved support is achieved to this extent. The bevel 26, 26a also permits deflection of the respective cover component by more than 90° with respect to the outer longitudinal duct as viewed in the line of sight to FIGS. 2 and 3, so that greater diversion of force is achieved, and this makes certain that the respective cover component 46 may not be pulled out of the longitudinal duct 36 by way of the associated end section 42, 44. The cover component 46 in question extends over the clear area of the frame component 12 and thus is limited by the latter on the edge side.

The solution claimed for the invention need not be limited to use in aircraft passenger seats but as a rule may be applied to any seat, in the area of motor vehicles as well, and is especially well suited in instances in which high rigidity accompanied by low weight is desired. By preference the hollow-chamber section is obtained by a conventional extrusion process.